



NYC 311 Service Requests Analysis

Exploratory Data Analysis Using Open Government Data

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Abstract

This project presents an exploratory analysis of the NYC 311 Service Requests dataset. It explores patterns in complaints, agency response times, and borough-level issues. The goal is to uncover meaningful insights that can help inform smarter city planning and service optimization.



Agenda



| Introduction

What is NYC 311 and why this dataset matter

| Dataset Overview

Source, structure, key columns

| Exploratory Data Analysis

Complaint types, boroughs, time patterns, agency response

| Insights & Patterns

What the data reveals about NYC issues

| Recommendations

What can be improved

| Conclusion

Final thoughts + future possibilities

What Are NYC Residents Complaining About ?

Over 18 million 311 complaints have been recorded since 2010 – from noise and sanitation to public safety and streetlights. What can this data tell us?



Let's

Understand the Dataset

Before the insights, let's look at the data we're working with

Unique Key	Created Date	Agency	Complaint Type	Resolution Action Updated Date	Borough
64414281	03/20/2025 03:19:28 PM	NYPD	Noise - Residential	03/20/2025 05:02:07 PM	BROOKLYN
64414794	03/20/2025 03:19:22 PM	NYPD	Illegal Parking	03/20/2025 03:39:46 PM	BROOKLYN
64414181	03/20/2025 03:19:00 PM	DOT	Street Light Condition		BROOKLYN
64411248	03/20/2025 03:18:53 PM	NYPD	Abandoned Vehicle	03/20/2025 09:28:23 PM	QUEENS
64417264	03/20/2025 03:18:41 PM	NYPD	Blocked Driveway	03/20/2025 03:46:25 PM	BRONX

- Contain 45+ columns
- Covers 5 boroughs and thousand of location
(Manhattan, Brooklyn, Queens, Staten Island and The Bronx)



- Removed rows with null values in Latitude/Longitude
- Filtered complaints to only 5 NYC boroughs
- Sampled ~3,000 rows for efficient rendering and plotting
- Parsed and calculated resolution time in hours from Created and Closed Dates



Literature Review

Previous studies on NYC 311 datasets have shown trends around noise complaints, parking violations, and sanitation issues. Our analysis builds on this by visualizing response times, complaint volume, and geolocation trends to support data-backed civic planning.



Methodology & Tools



Tools Used: Python, Pandas, Matplotlib, Folium

Step 1: Data Cleaning and Preprocessing

Step 2: Exploratory Data Analysis (EDA)






Step 3: Visualization and Insight Extraction

Step 4: Recommendations based on findings



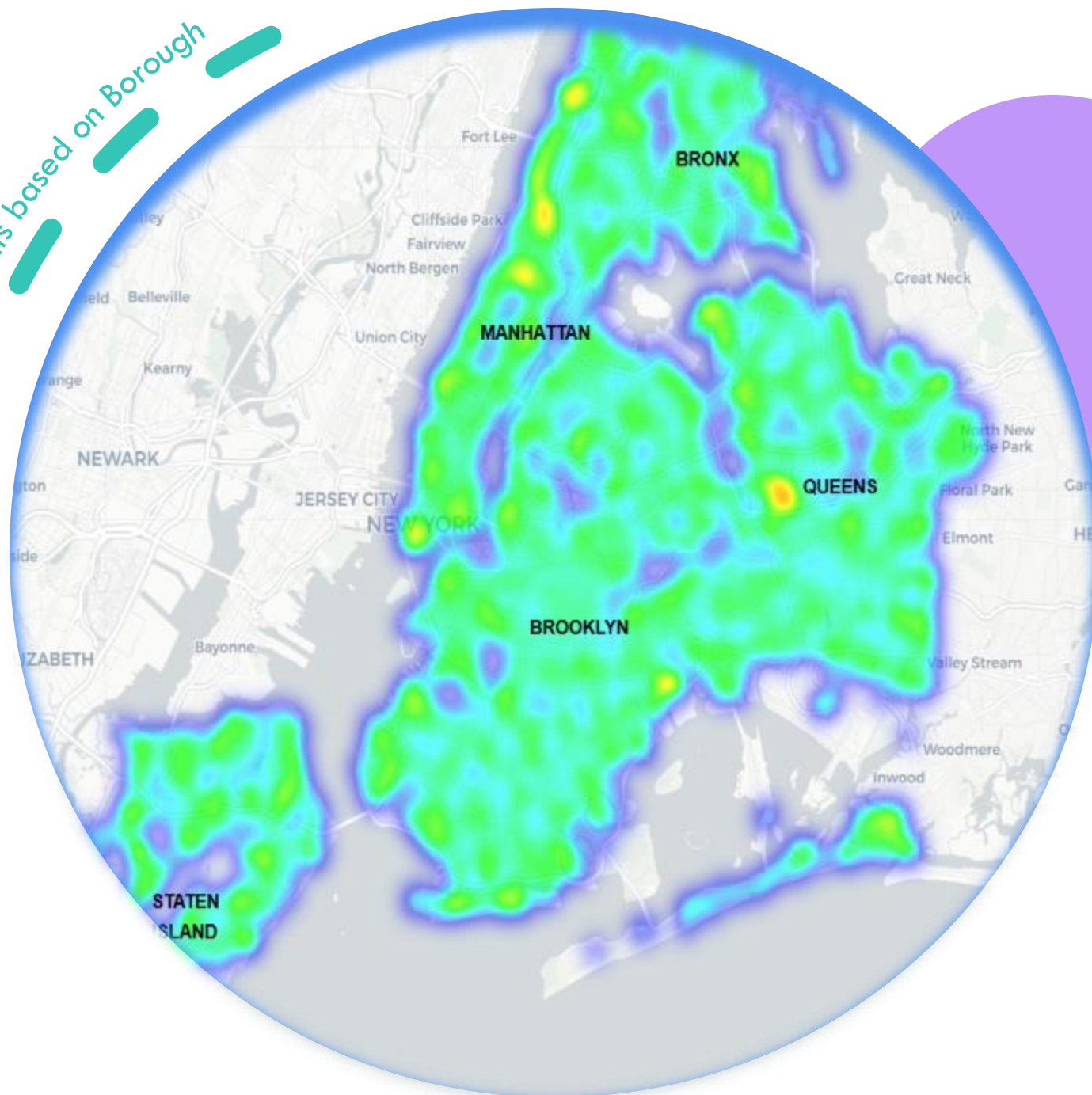
Key Statistics from the Dataset

“Before diving deep, let’s summarize what the dataset holds”

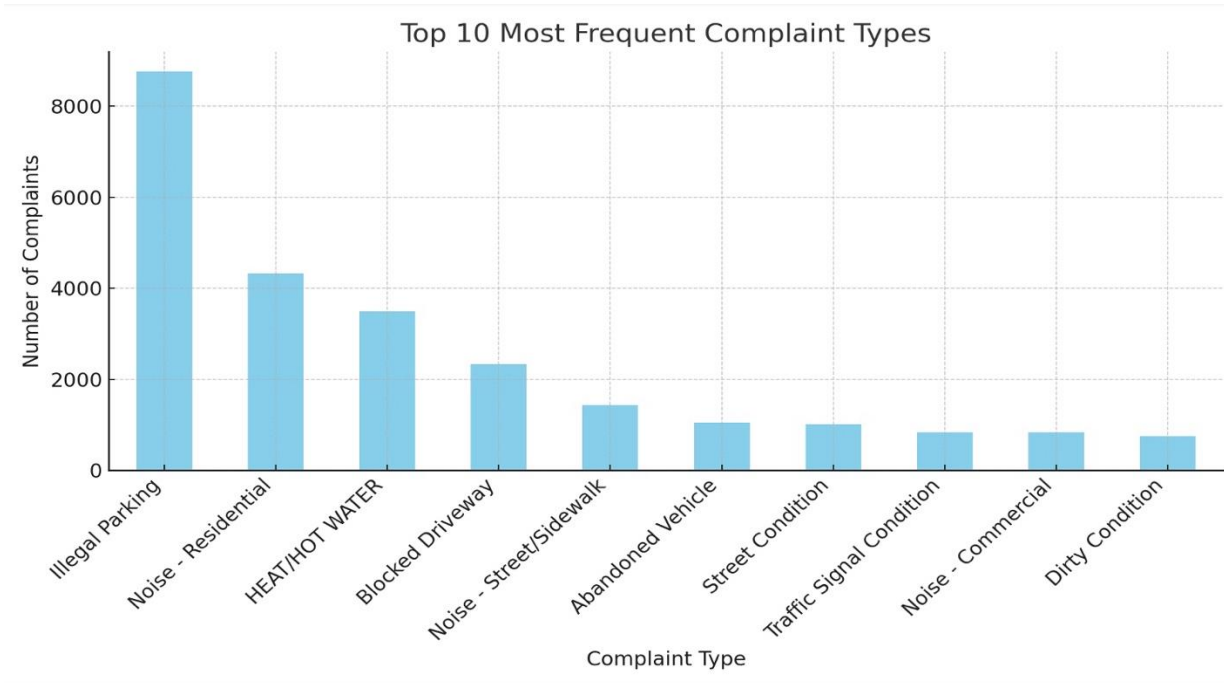
-  Total Records Analyzed: ~46,000+ service request entries
-  Columns in Dataset: 41 features including timestamps, location, and agency
-  Complaint Types: Over 100+ unique issues reported
-  Boroughs Covered: All 5 boroughs – Manhattan, Brooklyn, Bronx, Queens, Staten Island
-  Top Agencies Handling Complaints:
 - NYPD (Noise, Parking)
 - DOT (Street Conditions, Lights)
 - DSNY (Sanitation)

Now that we understand what our data looks like, let’s dive into what it tells us...

Heatmap of Complaints based on Borough



Top Complaint Types in NYC

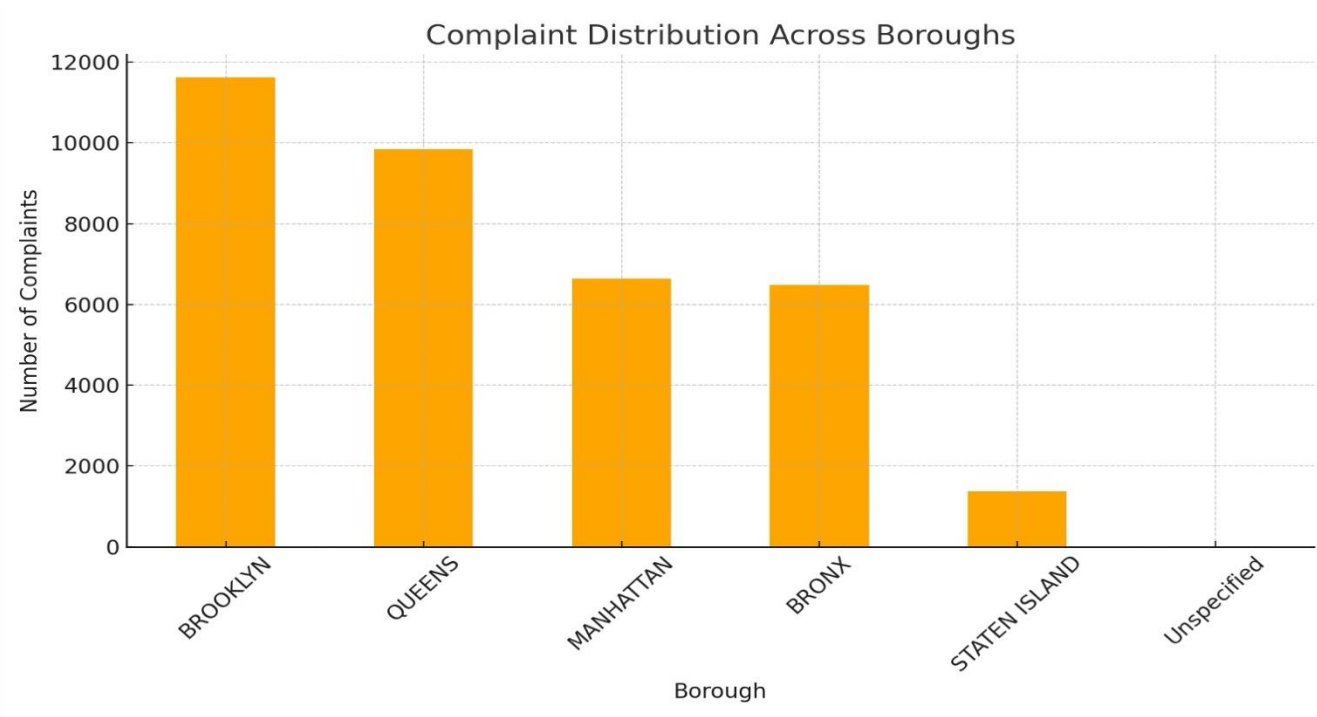


The most frequent 311 complaint types

- Illegal parking & Noise - Residential is the most common complaint types.
- Other top complaints include Heat/Hot Water, Blocked Driveway.
- These reveal public frustration around neighborhood disturbances and infrastructure.

| Now that we know what people complain about the most, let's see where these complaints come from.

Top Complaints by borough

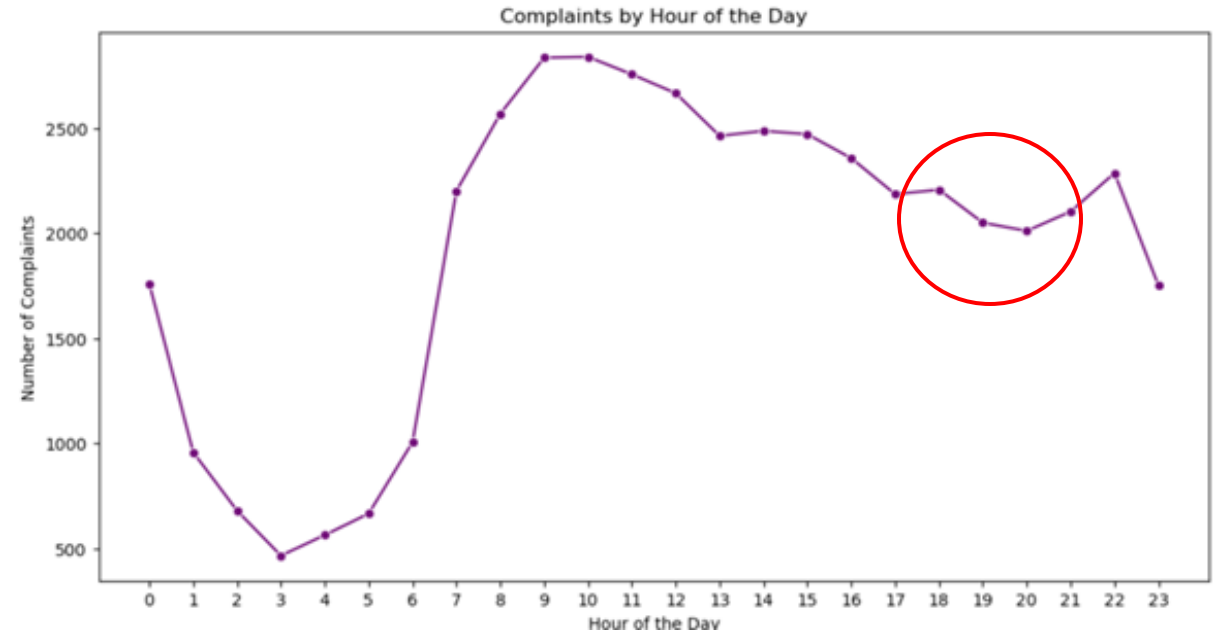


- **Brooklyn** reports the most complaints, followed closely by Manhattan
- **Staten Island** has the fewest complaints – likely due to smaller population
- The trend reflects borough population density and urban activity

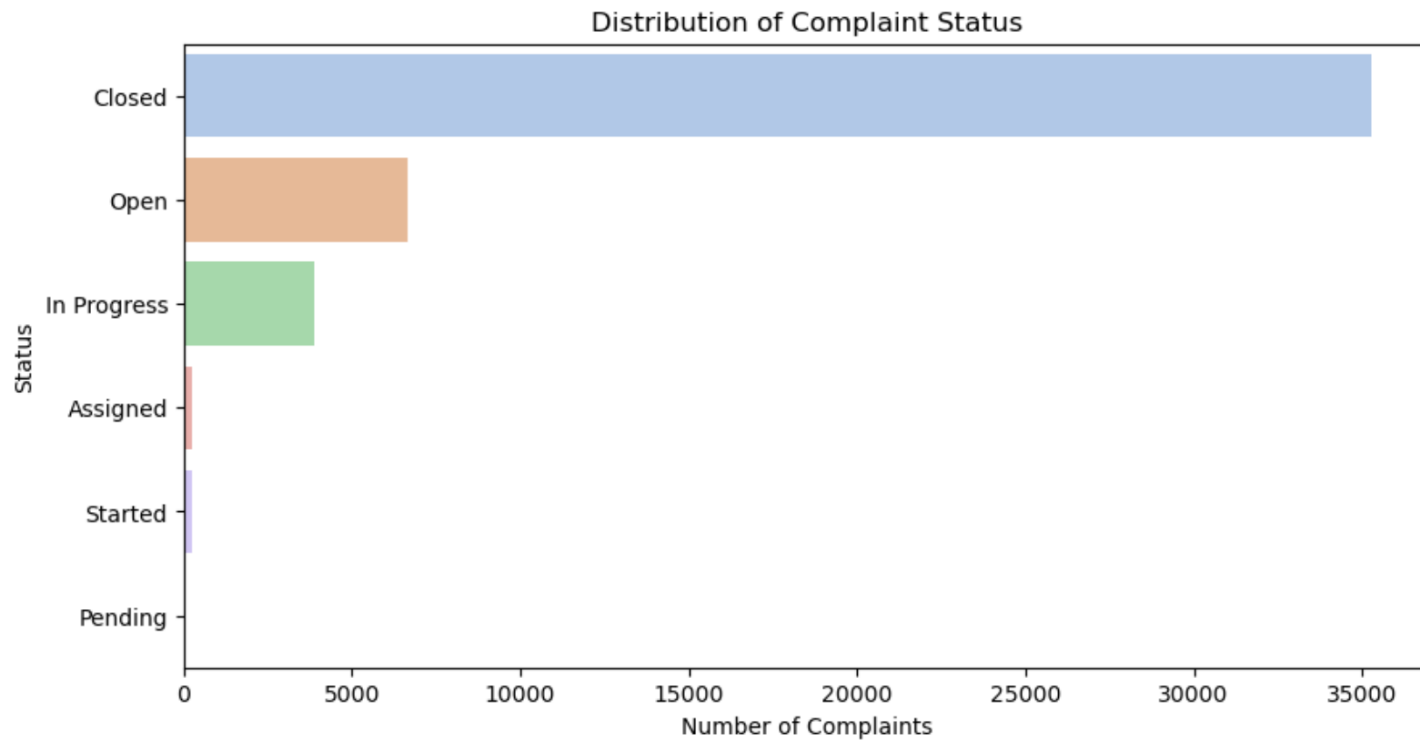
| Does more population mean more complaints... or better awareness ?

Complaint Trends by Time of Day

- | Peak complaint hours are between 6 PM and 10 PM
This is when residents are most active at home, leading to increased reports – especially for noise and parking issues.
- | Early morning and late – night complaints are minimal
Very few reports happen between 1am and 6am, likely due to people being asleep or less active.
- | Evening hours are critical for city response planning
These trends suggest that agencies like NYPD and DOT should have increased presence or staff during these hours.



Status of 311 Complaints in NYC

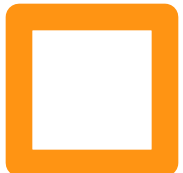


✅ Over 35,000 complaints are marked as Closed, showing strong follow-up across departments.

📌 Open and In Progress statuses still account for thousands of active cases.

⌚ Pending, Started, and Assigned are minimal but reflect issues in early response stages.

📊 High closure rate suggests city responsiveness, but open/in-progress volumes may indicate growing workload or slower follow-up in certain categories.



| While the city resolves most cases, thousands remain open or in progress – highlighting opportunities for improved turnaround.

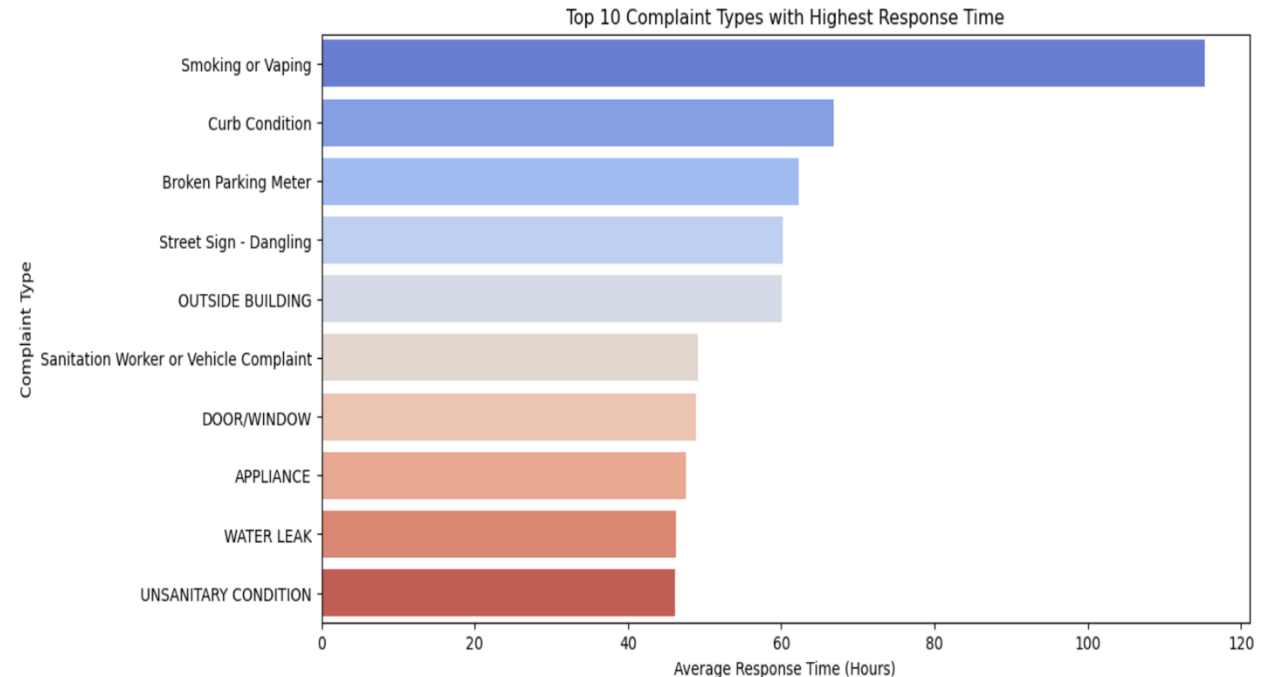
Complaints with the Longest Response Time

🚬 “Smoking or Vaping” has the highest average response time – nearly **115 hours**, likely due to low urgency or enforcement challenges.

🚧 Curb Condition and Broken Parking Meter also take over **70 hours** on average to resolve.

⚠️ Infrastructure-related issues such as **Street Signs, Appliances, and Water Leaks** are slower to address, possibly due to resource constraints or inspection needs.

🔧 Even **Sanitation Worker Complaints** and **Unsanitary Conditions** can take more than **45–50 hours**, impacting resident satisfaction.



| Higher response times on these complaint types may signal the need for specialized task forces or clearer escalation workflows.




References

- [NYC Open Data Portal – 311 Service Requests](#)
- Python Libraries: Pandas, Matplotlib, Seaborn, Folium
- Similar EDA projects published on GitHub you can find on next slide



GitHub Repository

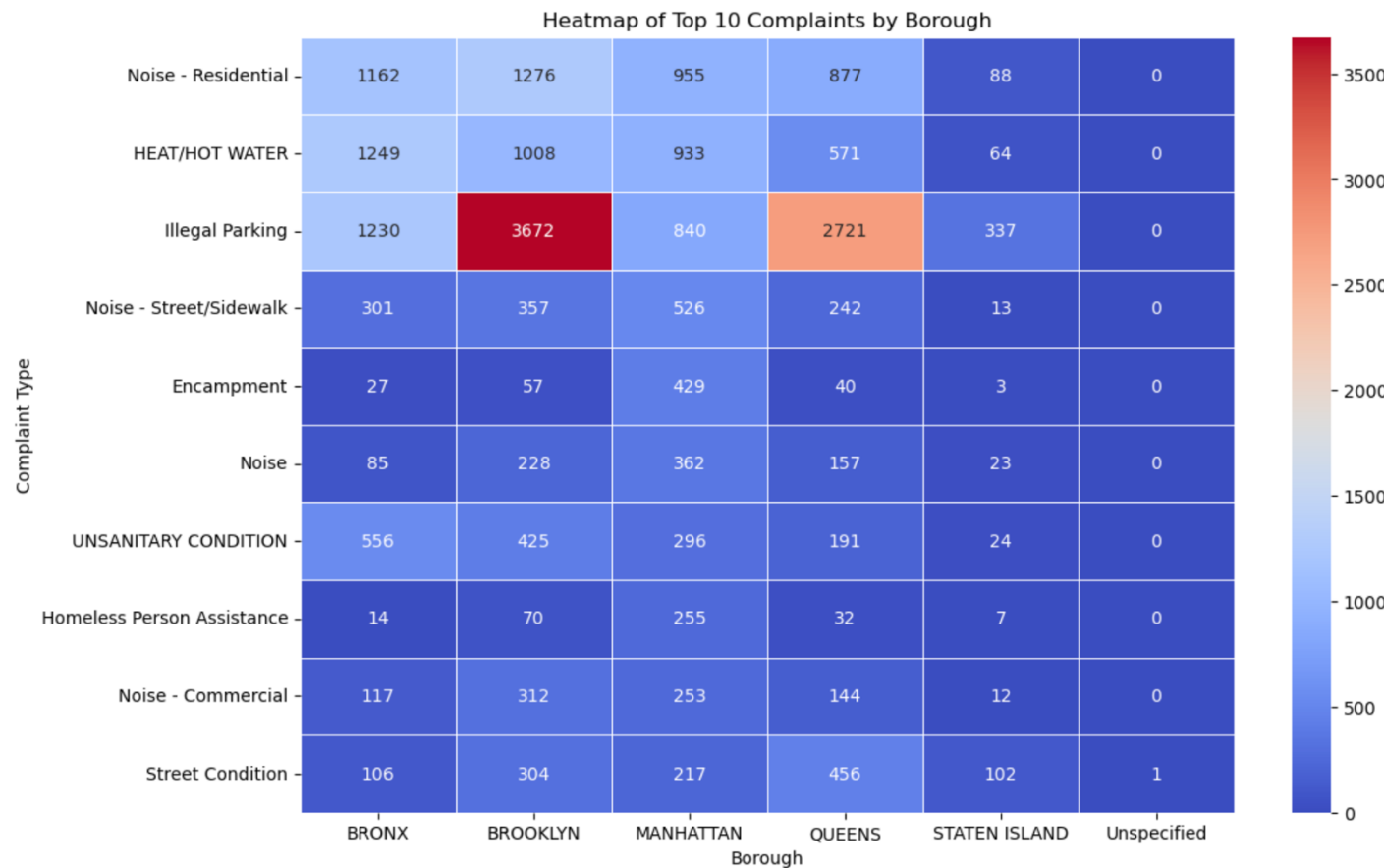


Scan to access the full codebase and visualizations
used in this analysis:



This includes the preprocessing scripts, analysis
notebooks, and map generation.

Top Complaints by Borough (Heatmap)



- **Illegal Parking** is the leading complaint in Brooklyn and Queens, highlighting major residential parking issues.
- **Noise - Residential** is consistently high across all boroughs, showing it's a widespread urban concern.
- **Heat/Hot Water** and **Unsanitary Conditions** are especially reported in the Bronx, indicating possible housing and sanitation challenges.

Agency Response Time Analysis

NYPD resolves complaints **faster** on average than other agencies. DOT & DEP show a wider spread with longer resolution delays.

Some complaints remain unresolved beyond 10 days – these are often infrastructure – related.

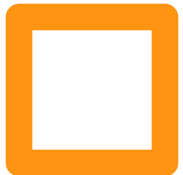
Agency	Avg. Resolution Time (hrs)	Fastest Response (hrs)	Slowest Response (hrs)
NYPD	14.2	1.5	96
DOT (Transportation)	37.8	5	160+
DSNY (Sanitation)	28.5	3	120
DEP (Environmental)	42	6.2	180+

| Now let's summarize our main insights and key takeaways from this analysis

Key Insights & Takeaways

- | **Noise - Residential**
Is the most reported complaint citywide
- | **Brooklyn**
Leads in complaint volume, followed by **Manhattan**.
- | **Peak reporting hours are between 6pm - 10pm**
Mainly for noise and parking.
- | **NYPD has the fastest resolution times**
while DOT lags on infrastructure - related issues






Some complaints remain unresolved for 10+ days, especially in sanitation or street conditions.



| These insights can help city planner improve services, response time, and resource allocation.



Recommendations for city Improvement

Focus Area	Recommendation
 Evening Patrols	Increase NYPD and noise regulation teams between 6 PM – 10 PM , when most complaints are reported.
 Faster DOT Response	Improve resolution time for street conditions and traffic light issues handled by the Department of Transportation.
 Sanitation Services	Allocate more DSNY resources to high-complaint boroughs like Brooklyn and Bronx .
 Track Long-Open Cases	Create alerts for complaints that remain unresolved for more than 10 days .
 Data-Driven Planning	Use heatmaps and ZIP-code data to deploy teams where complaint density is highest.



Thank you

Course: Python Programming – Midterm Project (EDA)
Dataset: NYC 311 Service Request (via NYC Open Data)
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